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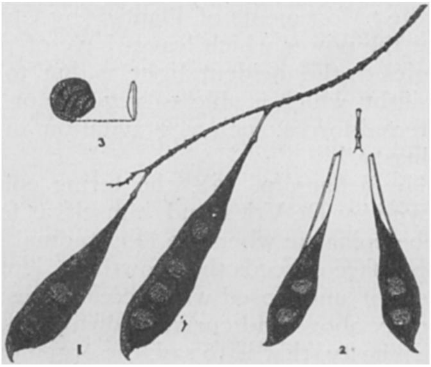
ment composed of small cylindrical rods which moved rapidly across the field of the microscope with a wriggling motion, often bending themselves to form a circle. This may be the same as that mentioned by Bechamp under the name of *Microzyma cretæ*. In the same journal, Professor R. B. Warder gives a list of papers referring to the influence of bacteria upon the changes of nitrogenous compounds.

That the natural nitrates are the result of a fungoid growth is a fact interesting to mineralogists as well as to chemists, biologists and naturalists generally.

BOTANY.[1]

Dispersion of Seed by Wistaria.—In January of the present year I gathered a few pods of the Chinese Wistaria (*Wistaria consequana* Benth.), and placed them in a vase on the mantel shelf. A few evenings after, while sitting at a table in the center of the room, with my back towards the mantel, I was startled by a loud, snapping report, and the consciousness that something struck against the ceiling directly above my head, and then against a window shade at the extreme end of the room. I imagined that this circumstance was caused by the explosion of an unusually refractory piece of coal in the stove, which was burning at the chimney behind me, with the door wide open. But I soon discovered that the smallest of my Wistaria pods, Fig. 1, had ruptured, and that the flying missile was one of its enclosed beans, which I found on the floor a few feet from the window, where it had rebounded after striking the shade. Fig. 3 represents this bean with its spiral lines of dark shading, and also gives a transverse section. All the figures are drawn one-third of the natural size. The valves of the pod in question, as shown at Fig. 2, turned entirely inside out at their lower extremity, and separated from their pedicel, not at the well marked juncture, but at a little distance below it. The other pod of the same raceme was wrapped in paper and laid away. A few days after I happened to hear the noise occasioned by its rupture, and found it had separated from its pedicel in the same manner, that is, about half an inch below the joint. This



Wistaria Pods.

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[1] Edited by Prof. C. E. Bessey, Ames, Iowa.

Wistaria bean, above mentioned, was thrown violently for a distance of sixteen feet and rebounded four feet. If it had been ejected with the same force from the position in which it grew on its native vine, it certainly would have flown for a distance of at least thirty feet. At all events, its enclosing pod proved itself to be an energetic vegetable catapult.—*Rev. J. L. Zabriskie, Nyack, N. Y., March, 1883.*

ADDENDUM TO ARTICLE ON THE COMPASS PLANT (*Silphium laciniatum*).—In the NATURALIST for August, 1882, to the list of papers on the subject, at the end should be added:

THOMAS HILL, LL.D.—Proceedings of Am. Ass. for Adv. of Science at Troy, August, 1870, p. 285.

THOMAS MEEHAN—Proceedings of Acad. of Natural Sciences Phila. for 1870, pp. 117–118.

——do. for 1875, p. 270

——Flowers and Ferns of the U. S., with colored plate of the plant, 2d series, 1880.

The extract on page 634 from paper by Francis Darwin in Journal of the Linnean Society, Vol. XVIII, No. 112, 1881, has some errors and omissions. It was copied from another journal. Now that I can copy from the original I give in full his conclusion of experiments "On the power possessed by leaves of placing themselves at right angles to the direction of incident light." He says, p. 449: "Thus the result of the experiments with the klinostat is on the whole to confirm the view published in the 'Movements of Plants' [by Charles Darwin, pp. 438–444], that the power which leaves have of placing themselves at right angles to the incident light, is due to a specialized sensitiveness to light, which is able to regulate or govern the action of other external forces, such as gravitation, or of internal forces such as epinasty."

He defines, p. 421, the terms epinasty and hyponasty, employed by De Vries and himself, as follows: "An organ is said to be epinastic when the longitudinal growth of the upper half or upper face exceeds the growth in length of the lower half; epinasty, if unopposed will therefore result in the organ becoming convex above and curving downwards.—Hyponasty is the reverse of epinasty, that is to say, the organ curves upwards owing to the lower increasing more than the upper half in length."—*Benjamin Alvord, Washington, D. C.*

AN APICAL CELL IN GYMNOSPERMS.—One by one the old characters relied upon to distinguish the cryptogams from the phanerogams are disappearing. We have long supposed that in the development of the stems and roots of phanerogams we had one character which could be considered reliable. The growing point (*punctum vegetationis*) in the cryptogams is a single cell, which by repeated fission gives rise to the mass of cells making up the stem or root. On the other hand, in the flowering plants, it has always been held that the growing point was made up invariably of a *group* of cells. We had thus a marked difference which seemed to draw a sharp line between the flowering and flowerless plants. It is true that in the ringless ferns (Marattiaceæ) of the tropics, and the adder tongues (Ophioglossaceæ), the growing point in the root is a group of cells, thus making a slight exception to the law, but in all these plants the stems develop from a single apical cell. So well established did this difference appear that in our " Botany for High Schools and Colleges," this sentence occurs (p. 87): " In the phanerogams the primary meristem is developed from a group of cells, instead of from a single one; they therefore have no apical cell."

We have now, however, the announcement by Dingler, in a recent paper (Ueber d. Scheitelwachstum des Gymnosperm-Stammes), that by making careful sections of the stems of seedling gymnosperms and rendering them transparent by maceration in water or by the use of potash, he was able to make out the presence of an apical cell in quite a number of instances. Thus an apical cell was well made out in a species of Ceratozamia, one of the Cycadeæ. It was also seen in the Norway spruce (*Picea excelsa*), in *Pinus inops* and *Cupressus pyramidalis*. In a single instance an apical cell was detected in a species of Ephedra, but as other observations failed to verify this, its occurrence may be doubted.

The importance of these observations will be obvious to every student of comparative botany (if we may be permitted to use such an Agassizian term as the counterpart of " comparative zoölogy "). They indicate a still closer relationship than we have suspected between the vascular cryptogams and the gymnosperms. It is significant that this pteridophytic character is to be found only in the *young* plants, in accordance with the biological law that disappearing structures may persist in the embryo or early life long after they have ceased to occur in the adult.—*C. E. Bessey.*

TRANSITION BETWEEN FORMS OF SCHIZOMYCETES.—C. v. Nägeli (Unters. u. neidere Pilze. München, 1882) is of opinion that all known forms of Schizomycetes are connected by intermediate links, and that any division into species, however convenient for the purpose of description, has no scientific value. There is no doubt that the same species occurs in widely different forms dependent on the mode in which it obtains its nourishment.—*Jour. Royal Mic. Soc., Feb., 1883.*

A GOVERNMENT DUTY.—The Government has long recognized the duty of providing means for the careful and exhaustive study of those insects which are injurious to the crops of the farmer, gardener, tree grower, etc. It has appointed eminent scientific men to devote their strength and time to the investigation of insect pests, and has placed sufficient sums of money at their disposal to enable them to visit different parts of the country, and thus to give to their work a thoroughness it could not otherwise have had. This is as it should be, and no intelligent person now doubts the usefulness of the Entomological Department at Washington.

But if the investigation of injurious insects be considered a government duty, will not the same reasoning show it to be equally its duty to provide for the similar investigation of the numerous parasitic fungi which injure and often entirely destroy farm and garden crops? The damage annually wrought by the fungi is but little if any less than that by insects. Take, for example, but one of the many affecting wheat and oat crops, viz., the rust, and we find that through it alone the country loses every year many millions of dollars; how many millions we hardly dare venture even to surmise, lest we be accused of exaggeration. However, as the annual wheat crop of the State of Iowa, is about forty millions of bushels, a reduction of but one tenth on account of the rust, would amount to a loss of four million dollars. When we remember that it is a very common occurrence for the injury from this cause alone to be fully a quarter or a third, and sometimes even one-half, it is evident that the annual loss must be placed considerably higher rather than lower. Add now the annual losses suffered on account of the smuts of various species, which affect wheat, oats, barley and Indian corn, and we have for the United States a sum aggregating at the very lowest estimate allowable, from fifty to one hundred millions of dollars.

But the losses are not confined to our staple cereal crops. The destroying fungi, like the harmful insects, are found attacking all our growing plants, whether upon the farm, in the vegetable or flower garden, or the conservatory. Even after our crops are gathered they are subject to the attacks of molds and mildews which unfit them for food and hasten their decay. And the very timber of which our houses and barns are constructed is infested by species which cause decay and destruction. It is needless to specify further. We have in the parasitic fungi and in some of the saprophytic ones, a host of enemies which annually destroy immense values. Is it not one of the duties of the Department of Agriculture at Washington to undertake the thorough and exhaustive study of these enemies? In what way could the department do more good to the great agricultural interests of the country than by inaugurating such a work?—*C. E. Bessey.*

BOTANICAL NOTES.—In the March *Grevillea* M. C. Cooke describes and figures a new Gasteromycete (*Cycloderma ohiensis*) from Ohio. In the same journal the editor describes and figures a curious case of a Vaucheria with distinctly septate filaments. All doubts as to its identity were removed by finding the characteristic oögonia and antheridia. He strongly suspects that under certain conditions zoögonidia may be produced by vaucheria, and suggests the need of careful re-examination of all the species. ——Wm. Trelease has published an interesting paper "On the Structures which favor Cross-fertilization in Several Plants" (Proc. Bost. Soc. Nat. Hist.), in which many curious facts are brought together. Three plates accompany the paper, and add much to its value.——Professor Grant Allen's paper on "The Pedigree of Wheat," republished in the *Popular Science Monthly*, for March, from *Macmillan's Magazine*, is an entertaining though rather speculative account of a possible genesis of the grasses in general, and the wheat plant in particular. The main proposition is given in the opening sentence, "Wheat ranks by origin as a degenerate and degraded lily."——A flowering plant, new to science, from North Wales, has just been described by Arthur Bennett in the *Journal of Botany*. It is a Potamogeton, and is named *P. griffithii.* As long as new species can be found in Great Britain our collectors need not despair in any part of the United States.——J. G. Baker's "Synopsis of the Genus Selaginella," now running through the numbers of the *Journal of Botany* will form, when completed, a valuable addition to our knowledge of these beautiful and interesting plants. We hope to present a summary of it when completed.——Some curious monstrosities in fungi are described and figured in the October and January numbers of *Revue Mycologique.*——We have received a set of Pacific Coast Ferns from J. G. Lemmon, of Oakland, Col., the well-known collector. Among them are many very rare and interesting species. The specimens are generous, well preserved and neatly labelled. ——The same collector is preparing for distribution sets of phanerogams, including many new species, or rare ones, from the Arizona region. Among these are *Astragalus hypoxylus* Wats., *Mimosa lemmoni* Gr., *Stevia plummeræ* Gr., *S. amabilis* Lemmon, *Erigeron lemmoni* Gr., *Gentiana microcalyx* Lemmon, *Ipomœa thurberi* Gr., *I. lemmoni* Gr., *I. cuneifolia* Gr., *Verbena arizonica* Gr., *Euphorbia plummeræ* Wats., *Microstylis purpurea* Wats., etc.——Ravenel's Centuries VII and VIII of Fungi Americani, have been received. They contain many interesting species described or noticed in recent numbers of *Grevillea.*

ENTOMOLOGY.[1]

RAILROAD CARS AS A MEANS OF DISSEMINATING MOTHS.—Have you ever thought of the railroads as a means of disseminating Noctuidæ? Traveling more than usual the past fall and summer, I was often struck with the numbers of Aletiæ on the trains. There were probably many others on the outside fluttering at the lights or at rest upon the cars. I do not give it as of great value or by any means conclusive; but there has

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[1] This department is edited by PROF. C. V. RILEY, Washington, D. C., to whom communications, books for notice, etc., may be sent.